Outbreak Scenarios

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Military Outbreaks

- Those having affected military SMs, during or between conflicts
- Anything to have triggered the phone call, “we have an outbreak”

Diarrhea at Ft. Bliss

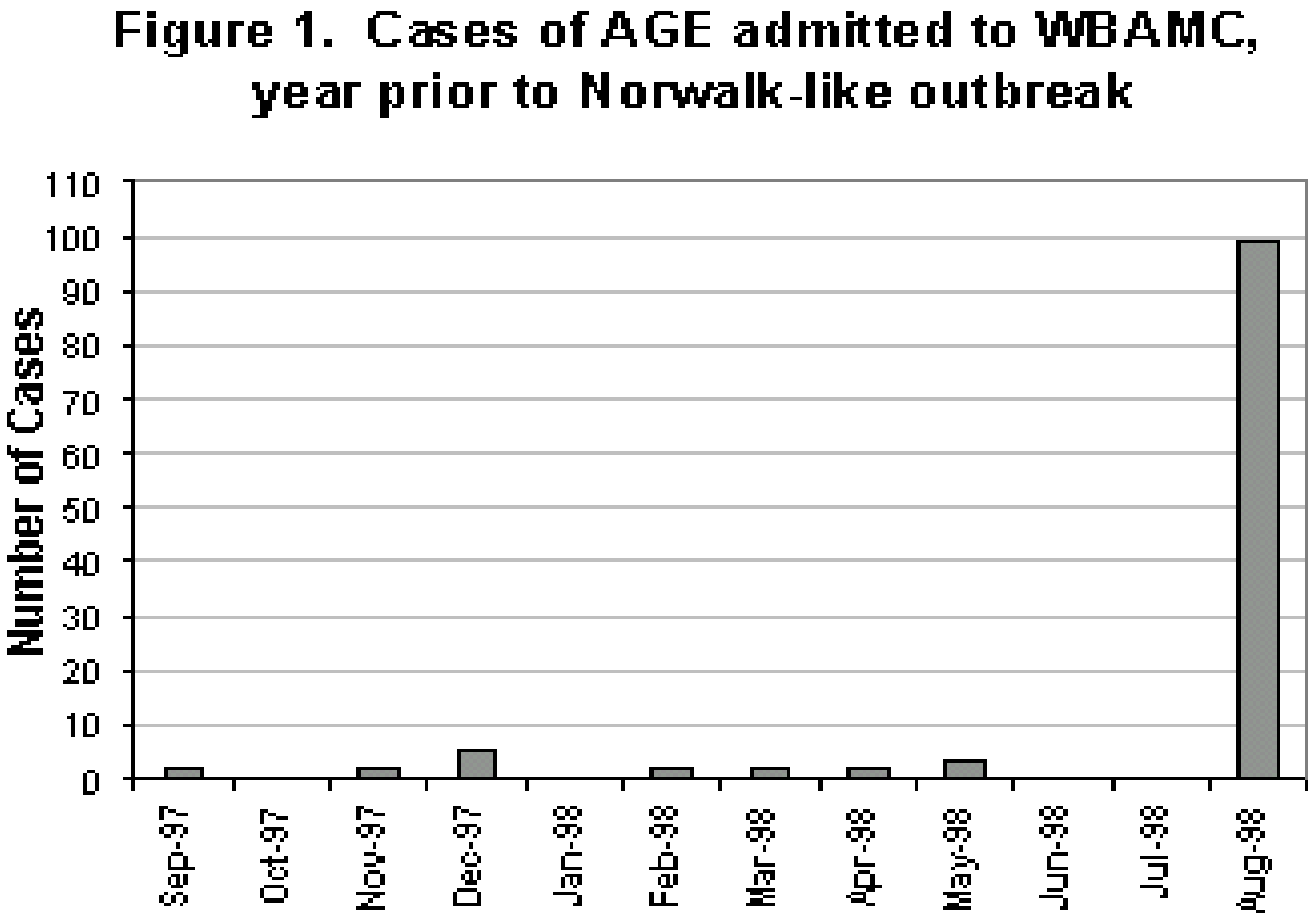
- In 4 days at end August, 1998, 99 soldiers hospitalized at William Beaumont AMC (Ft. Bliss) with acute gastroenteritis
- 12% (99/835) of population in barracks area, eating at 2 mess halls

Table 1. Presenting symptoms among hospitalized soldiers, 1998 Fort Bliss AGE outbreak

Symptom	Number (from 90)	Percent (%)
Nausea	79	88
Vomiting	72	80
Abdominal pain	68	76
Diarrhea	60	67
Fever/chills	37	41
Headache	20	22
Photophobia/eye pain	3	3

MSMR Oct/Nov 1998 (amsa.army.mil)

Clearly above background rate



Diarrhea at Ft. Bliss

- Case defined: 3 or more loose stools in a 24 h period in week before outbreak, or hospital admission for AGE
- Data sheets: cases with high OR for eating in one mess hall: plausible source

Table 2. Odds ratios for selected exposures, 1998 Fort Bliss AGE outbreak

Exposure	Odds Ratio	95% CI
Ate at dining facility (DF) 1 prior to illness	9.8	(2.8, 40.2)
Soft drink	3.8	(2.0, 7.2)
Ate more at DF1 than DF2	3.7	(2.0, 6.9)
In week of outbreak:	**Odds Ratio**	**95% CI**
Crumb cake	2.4	(1.2, 4.8)
Ice cream	1.7	(1.1, 3.0)
Cinnamon roll	1.7	(0.8, 3.7)
Pie	1.5	(0.9, 2.7)
Ice	1.5	(0.8, 2.9)

Diarrhea at Ft. Bliss

- Mess hall shut down/cleaned: outbreak interrupted
- Routine enteric pathogens excluded with stool analyses/cultures
- RT-PCR at CDC positive in 15/20 specimens for norovirus—much later, after outbreak interrupted

Lessons Learned

- Clear outbreak
- Defined syndromically: no etiologic diagnosis necessary before intervention decisions
- Only either PCR or EM could have diagnosed this---newer technologies are helping

Meningococcal Meningitis in Ft. Leonard Wood 2002

- Great Plains RMC commander gets call to send PM chief to FLW, Feb 2002
- 50 yo civilian lady (News person) spent 3 hours on FLW volunteering for community project
- 3 days later, sore throat, fever, arthralgias, progressing to syncope, DIC, meningitis, death. Cultures neg, but *N. meningitidis* non-B antigen detected in CSF.

Meningococcal Meningitis in Ft. Leonard Wood

- Local news is outside gate with satellite news van—please help us
- During damage control:
  - 27 March—first of the next 8 cases of either confirmed, probable, or suspect *N. meningitidis* menigitis associated with FLW
  - Last case June

MSMR, May and July, 2002

Meningococcal Meningitis in Ft. Leonard Wood

- Diagnosis correct
- Rates higher than background
  - “Outbreak” also as defined by CDC (14/100,000 persons, >10/100,000 persons in 3 month period)

Meningococcal Meningitis in Ft. Leonard Wood

- Progressively, mass vaccination implemented
  - Breakthroughs
- Mass chemoprophylaxis initiated in highest risk cohort (Navy AIT cohort, n=194, rate 1,025/100,000)
  - Loathe to do: fluid population, fluid bug with fluid horizontal transmission
  - But: single dose FQ prophylaxis has made a little easier

Meningococcal Meningitis in Ft. Leonard Wood

- Eventually, cases peter out
- Combination of time of year, and aggressive interventions

Coccidioidomycosis Outbreak in San Diego?

- 7 cases of disseminated coccidioidomycosis seen and treated, NMC-San Diego, between May and June, 2002 (2 months)
- 5 years previously, 7 other cases found
- 20-fold increase
- 4 active-duty

Crum NF et al., Mil Med 2003

Closer Look

- Diagnosis very believable
- Cases from 7 widely disparate locales
  - NAS Lemoore (AA)
  - Fresno (Hispanic dependent)
  - NAS Miramar (AD AA)
  - Ft. Irwin (AD AA)
  - Camp Pendleton (AD Filipino)
  - Chula Vista (San Diego; Filipino)
  - Chula Vista (AA)

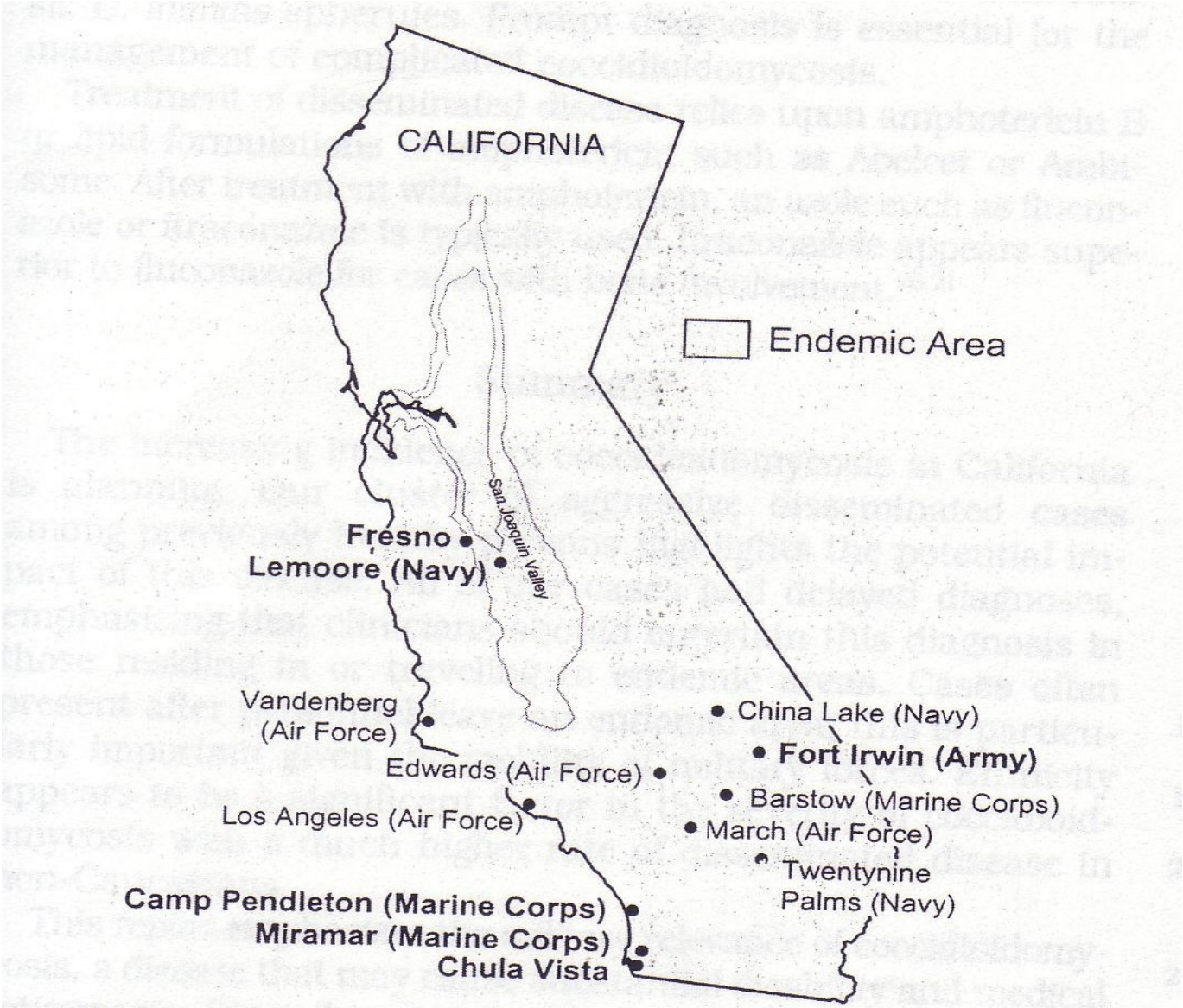


Fig. 1. Major military bases in coccidioidomycosis-endemic areas in southern California. Locations of cases appear in bold.

Crum NF et al., Mil Med 2003

Closer Look

- All presented to primary care over actually 7 months (Sept-April)---trickled into NMSCD on referral delays
- No review of actual incidence of new cocci (simple or disseminated) in referral base
  - ? Merely referral differences, threshold or pattern?
- No explicable causality:
  - dust storm, earthquake/landslide, known increase in civilian population

The Dubious Outbreak

- Not enough data presented to honestly decide whether truly an outbreak
  - Violates Rule 1.b.: is there confidently an increase in the incidence over time and place?
- Dangers of second-order (post-referral) data
  - Persian Gulf Illness data (self-reporting) rife with this

Surgical Wound Infections, BAMC

- October 2003: 6 cases of sternal (post-sternotomy) wound infection, Brooke AMC—”an outbreak”
- Review of diagnosis: no question; SWI by NNIS criteria
- All presented over 6 months; surgeries over 8-9 months
- Background rate: 1-2 during similar interval (ascertainment question)

Surgical Wound Infections, BAMC

- Resources marshaled
- In interim,
  - No more cases present X 3 months
  - O.R. visited by IC nurses who watch procedures (?Hawthorne effect?)

Surgical Wound Infections, BAMC

- Surgeons and IC breathe sigh of relief —”it’s not an outbreak after all”
- Indeed, “aborted” outbreak

Surgical Wound Infections, BAMC

- BUT
  - O.R. observations raise questions about standard procedures/techniques in support staff
  - Review of SWIs in other areas:
    - Ortho “blip”, winter 1999-2000
    - Plastics “blip”, 2002
    - Gyn onc “blip”, winter 2002-2003
  - All resolved on own without specific intervention

Surgical Wound Infections, BAMC

- In retrospect, probable general operating sloppiness at bottom of multiple “aborted” outbreaks
- Data used to tighten O.R. procedures
  - Buy new personnel
  - Dedicate personnel to tasks
  - Emplace/empower disciplinary rules for sloppiness
    - (JCAHO is GOD, but this time it’s on our side)

Surgical Wound Infections, BAMC

- Lessons:
  - Even the aborted outbreak can have its lesson to tell
  - Random rise and fall of event frequency does occur in Nature, but
    - Bulldogging a little may turn up useful data
    - Have to be reasonable about when to stop

Malaria in Soto Cano

- 1999: E-mail comes in requesting microscope slide review for malaria
- During previous 2 weeks, 45 soldiers at JTF-B (Soto Cano, Honduras) diagnosed with malaria
- Background incidence: 1-2 new cases/year

Malaria in Soto Cano

- Significant loss of work force
  - Chloroquine making everyone queasy
  - All came in with varied symptoms, including sprained ankles, VURIs

Malaria in Soto Cano

- “Could this be an over-call by the laboratorians?”
- No---they’re all experienced microbiologists (Master’s degrees), they’re sure

Malaria in Soto Cano

- Can send the slides up for review?
  - Well, we want you to see the patients too
- Theater clearance granted for TDY next day
- Before plane leaves ground, phone call comes in that Hospital Escuela parasitologist reviewed slides---no malaria

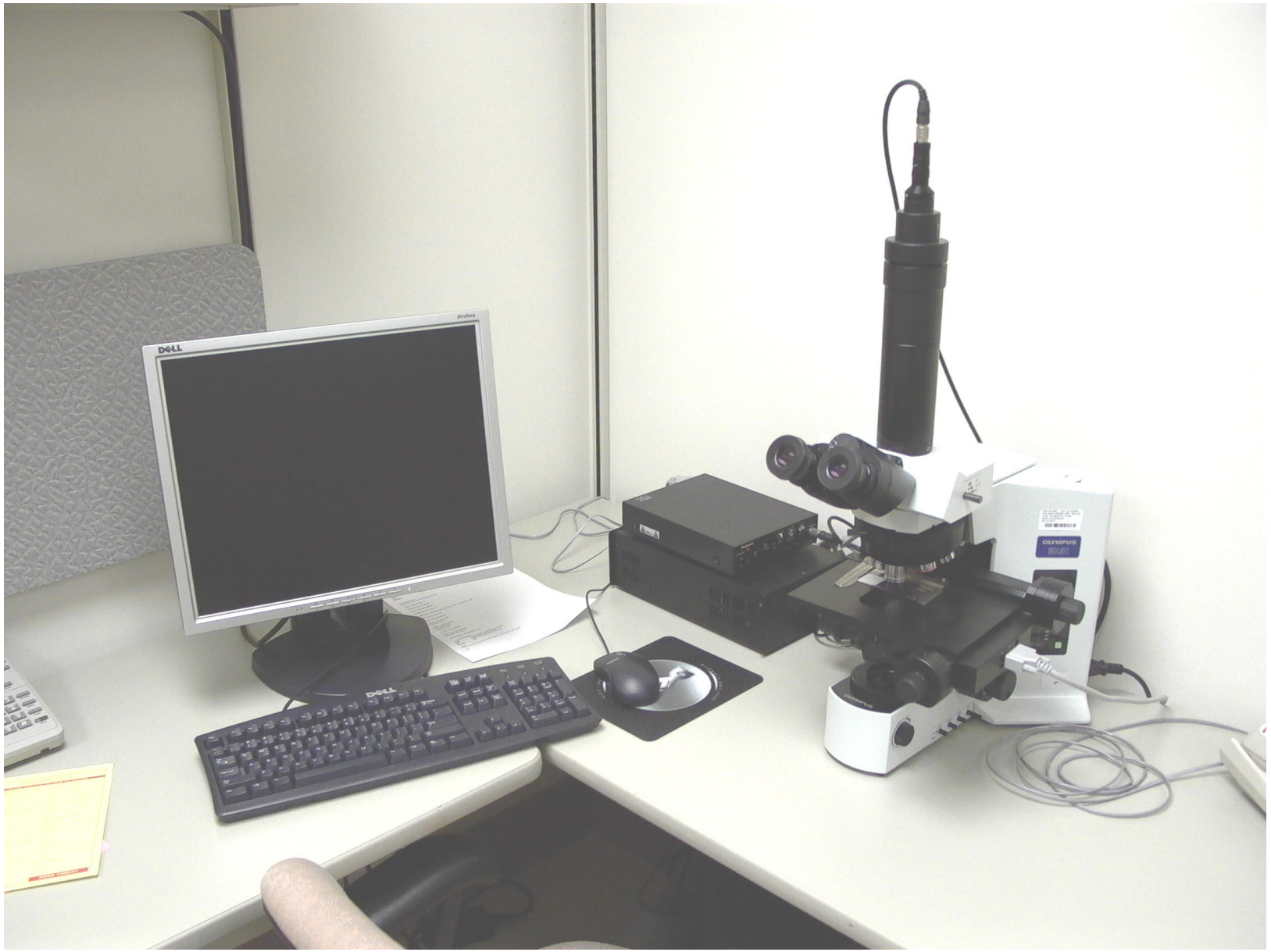
Malaria in Soto Cano

- In retrospect, expert American microbiologists were 2 new AML graduates
- Over-calling platelets on RBCs

- The pseudo-epidemic: violation of Rule 1.a. (get the diagnosis right)

Malaria in Soto Cano

- Lessons learned---isn’t there a better way to diagnose this?
- $65,000 remote telepathology device
  - 45 minutes of review with packed *falciparum* slide---not one seen


DELL
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Malaria in Soto Cano

- Just shoot the picture!
  - Digital camera held up to microscope lens
  - 2/3 of time, obvious malaria or no malaria. PPV/NPV by blinded readers high.
  - Uncertain calls---gray zone
  - Species not so confident

Mody R et al. IDSA abstract, 2003

Toxic Dermatitis in El Salvador

- E-mail/phone calls come in from Military Mission/El Salvador embassy
- Medical component detects toxic dermatitis in attached personnel
- Permanent party and TDY (2-3 months each)
- 10-15 currently diagnosed
- None in previous years, at any one time

Toxic Dermatitis in El Salvador

- How toxic dermatitis defined?
  - Actually, variable presentations, different patients
    - Eczematous rashes on exposed areas, evanescent
    - Folliculitis-like rashes on all surfaces
    - No fever. No response to antibiotics, or not treated
- Why do you think toxic?
  - Personnel working around chemical waste areas. Exposure type/duration varies.

Toxic Dermatitis in El Salvador

- No dermatologist in sight
- Digital photos taken, sent
  - Quite varied in appearance, as described.
- Phone calls start coming in from SOUTHCOM
  - What's wrong with our guys down there?

- (Answer: I'm a doctor, Jim, not a dermatologist!)

Toxic Dermatitis in El Salvador

- Can’t get over Rule 1 hurdle: what’s the diagnosis?
- Dermatologist sent (JTF-B asset)
- Diagnosis: variety of transient, unrelated, treatable dermatitides

- Medical Component asset was very sharp, very zealous, brand new Master’s degree 91W (corpsman).

Toxic Dermatitis in El Salvador

- Pseudo-outbreak: wrong diagnosis

Acute Eosinophilic Pneumonia in Iraq 2003

- Details given in previous talk
- Pseudo-outbreak: diagnosis was correct (atypical pneumonias, with proportion of acute eosinophilic pneumonias)
- But, no outbreak: no difference in rates compared to rates expected

Infectious Mono at Lackland AFB 1999

- Month of January, 1999, potential outbreak noted by laboratory personnel of Wilford Hall MC (LAFB) of infectious mononucleosis
- Laboratorians detected a rise to 40% of Monospot test positivity (105/266)
  - Background:
    - January 1997 21/134; 16%
    - January 1998 11/110, 10%

MSMR Feb 2001

Infectious Mono at Lackland AFB 1999

- Reasons for sending test: clinical suspicion, among both hospital employees (n=30), also ambulatory patients
- Tests performed in primary care clinic

Infectious Mono at Lackland AFB 1999

- 20 of the 30 positive tests from hospital personnel, and all positive tests from pararescue trainees, re-run
  - All negative

Infectious Mono at Lackland AFB 1999

- The Monospot card test
  - Agglutination or not; white chunks on a black circular background
  - Judgment call on part of reader. Minimal, but some, experience required
- Manufacturer contacted: no other recent reports of false positivity with test

Infectious Mono at Lackland AFB 1999

- Testing moved to WHMC main laboratory
  - Background rates of positivity
- Testing eventually returned to primary care clinic
  - Background rates of positivity

Infectious Mono at Lackland AFB 1999

- Another pseudo-outbreak.
- Then, response: “All positive Monospot test results are now confirmed with the EBV VCA IgM and IgG”
- $$
- Wrong lesson learned.